Uytterhoeven et al., and Morgan et al., and further in view of U.S. Patent 6,440,649 (Simpson et al.).

Both of these rejections are respectfully traversed for reasons presented below. Each one is considered in turn.

Rejection I:

The Office Action supports its rejection with Winslow et al. as the primary reference for its teaching relating to preparing a photothermographic emulsion comprising the step of providing silver halide grains and a non-photo-sensitive silver source, and chemically sensitizing the silver halide grains by decomposing an organic sulfur-containing compound (such as merocyanine dye) in an oxidizing environment. This reference is also alleged to describe photo-thermographic emulsions and materials as well as the conversion of part of the organic silver salt to silver halide with a halogen-containing compound.

Riester et al. et al. is said to describe the use of various phosphine sulfides as "supersensitizers" to increase the spectral sensitization of the silver halide. It is alleged that Riester et al. then teaches the use of such compounds in the photothermographic materials of the presently claimed invention.

The Examiner has for the first time cited Uytterhoeven et al for disclosing photothermographic materials incorporating a combination of silver halide made *ex-situ* with silver halide made *in-situ* in order to provide photothermographic materials with increased sensitivity and contrast (Col. 19-20, Table 4, and Col. 26-28, claims 1-28 [sic. 1-13].

Morgan et al. is cited for its disclosure of forming *in situ* silver bromide using a source of halide ion in reaction with silver ions of the organic silver salt that is said to enhance the image forming capacity of the composition far beyond the use of preformed silver halide alone (Col. 4, lines 7-22).

The Office Action then alleges that the presently claimed invention is obvious because Winslow et al. teaches the chemical sensitization process except for the use of Applicants' "PS" compounds, Riester et al. teaches those compounds in silver halide emulsions, Morgan et al. teaches the use of in-situ prepared silver halide, and Uytterhoeven et al. teach the use of a combination of *in-situ* and *ex-situ* silver halide.

Applicants' Invention:

Applicants' again point our that their claimed invention is directed to a method of preparing a photothermographic emulsion and material using a specified order of steps and the defined diphenylphosphine sulfide compounds. The method includes:

A) providing a photothermographic dispersion of preformed photosensitive silver halide grains and a non-photosensitive source of reducible silver ions,

B) providing one or more of the defined diphenylphosphine sulfide compounds in association with the dispersion of step A),

C) chemically sensitizing the preformed photosensitive silver halide grains by decomposing the diphenylphosphine sulfide on or around the preformed photosensitive silver halide grains in an oxidative environment, and

D) converting some of the reducible silver ions to photosensitive silver halide grains.

Photothermographic materials are constantly being redesigned to meet ever-increasing performance, storage, and manufacturing demands raised by customers, regulators, and manufacturers. One of these demands is increased photospeed without a significant increase in fog ($D_{min}$) or a loss in $D_{max}$. Thus, while the current commercial method of chemical sensitization described in U.S. Patent 5,891,615 (Winslow et al.) has provided increased photospeed for photothermographic emulsions over previous methods, there is a continued need for a further improved method that provides even greater photospeed for such emulsions.

Applicants have met that need. The present invention provides photothermographic emulsions and materials having increased photospeed ("speed") by using the noted sequence of steps and specific diphenylphosphine sulfides for chemical sensitization when compared to the use of sulfur-containing spectral sensitizing dyes known in the art (e.g. the merocyanines of Winslow et al.).

Example 2 of the present application (pages 78-79) provides comparative data that is evidence of patentability over the teaching in the art. Several photothermographic materials were prepared, imaged, and evaluated using the procedures described in Example 1 (pages 73-76). Control Example 2-1

contained no chemical sensitizer and Comparative Example 2-2 was prepared using a merocyanine dye as a chemical sensitizer according to Winslow et al. Inventive Examples 2-3 and 2-4 were prepared using two diphenylphosphine sulfide compounds according to the present invention.

The sensitometric results obtained from these photothermographic materials are shown in TABLE II (page 79). The photospeeds (measured at two places on the Density vs. log E curve, SP-2 and SP-3) were unexpectedly increased using the method of the present invention compared to both the Control and Comparative Example 2-2. In the case of SP-2, the increase was 12% and 22%, and for SP-3, the increase was 8% and 18%, over the Comparative Example 2-2 (Winslow et al. method). Thus, Applicants have demonstrated that the use of representative diphenylphosphine sulfides as chemical sensitizers provides unexpected photospeed increase over the use of known sulfur-containing compounds.

In addition, Applicants have provided a **Rule 132 Declaration** with their previous response by Co-Applicant Sharon Simpson in which she described the comparative Example 8 provided in co-pending and commonly assigned U.S. Serial No.10/731,251 (filed 12/9/03). While the invention described and claimed in that copending application is directed to the use of a combination of Au(III) compounds and diphenylphosphine sulfides as chemical sensitizers in photothermographic materials, the Example 8 comparative results are equally cogent as evidence for patentability of the presently claimed invention. The processes used in the Declaration were sufficiently similar to the presently claimed process so that the comparative data have merit in support of unexpected results for the present invention. The Declaration demonstrates both processes of making photothermographic materials and the materials made there from. Moreover, the Examiner should appreciate from simple logic that the GOLD compounds tested in the Declaration were used at the same concentration so their effects were cancelled. The only effects measured in the comparative examples shown in the Declaration were those demonstrating the ineffectiveness of triphenylphosphine sulfides vs. the effectiveness of diphenylphosphine sulfides in sensitization. This comparison has scientific credibility, as any skilled person in the chemical arts, such as Dr. Sharon Simpson, would readily appreciate.

Dr. Simpson points out in her Declaration, as well as in Example 8 (pages 102-103) of the copending U.S. Serial No. 10/731,251 that the use of a diphenylphosphine sulfide compound provided significantly better photospeed and image contrast in photothermographic materials compared to the use of a triphenylphosphine sulfide that is outside the scope of the present invention. These results are evidence of unexpected results because Applicants do not claim the use of just any phosphine sulfide or phenylphosphine sulfide. Rather, they claim the use of only certain diphenylphosphine sulfides and the use of phosphine sulfides outside of the claimed invention are less effective as chemical sensitizers.

Rebuttal to Rejection:

Applicants respectfully submit that the rejection of Claims 1-13, 15-17, and 19-23 is in error because: (1) Riester et al. has been improperly combined with Winslow et al., Uytterhoeven et al, and Morgan et al. and the last three references cannot support a rejection alone; (2) even if all four references are properly combined, no *prima facie* case for unpatentability has been made; and (3) even if the four references are properly combined, Applicants have provided a showing of unexpected results over the combined teaching.

Riester et al. has been improperly combined with the other three references because it is non-analogous art. Riester et al. is directed to photographic materials containing a silver halide, which materials are processed after exposure, using wet photographic processing solutions (e.g. Col. 17, lines 30-44). Nothing in Riester et al. hints of "dry-processed" photothermographic materials.

In order for a reference to be "analogous" prior art, the reference must be in the field of Applicants' endeavor or, if not, then be reasonably pertinent to the particular problem with which the Applicants are concerned, *In re Oetiker* 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992) and *In re Deminski* 230 U.S.P.Q. 313 (Fed. Cir. 1986). The Court has also said that a reference can be "analogous" art if "it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem", *Wang Laboratories Inv. v. Toshiba Corp.* 26 U.S.P.Q.2d 1767 (Fed. Cir. 1993).

The imaging arts have long recognized the differences between these two imaging systems and the unpredictability of using components in each one. It is well known from dozens of publications that one cannot predict the utility of photographic components in photothermographic materials because of the very different imaging chemistries, conditions, and retention or lack of retention of imaging chemistries in the imaged materials. The differences between photothermography and photography are outlined on pages 2-4 of the present application and several references cited therein. These differences have been recognized in the imaging arts for many years and have achieved separate classification in the USPTO as well as other patent searching systems.

The differences between photothermography and photography are outlined on pages 2-4 of the present application and several references cited therein. As noted on page 5 (lines 14-20), the effects of chemical sensitizers used in photographic emulsions and materials are not necessarily achievable in photothermographic emulsions and materials. The best that can be said for such chemical components is that they would be "obvious to try" in photothermographic materials, but without any reasonable expectation of success, merely trying the compounds in the photothermographic materials does not render such use unpatentable. Thus, without motivation in the art in general or in Riester et al. specifically, one skilled in photothermography would not consult the photographic teaching in Riester et al. to find "new" chemical sensitizers for use in the photothermographic emulsions of Winslow et al., Uytterhoeven et al., and Morgan et al.

It is therefore clear that Riester et al. fails the first test for "analogous" art—it is not in Applicants' field of endeavor. Riester et al. is photographic art, not photothermographic art.

It also fails the second test. It is <u>not</u> reasonably pertinent to the particular problem addressed by Applicants' claimed invention. As pointed out above, Applicants have found chemical sensitizers that when oxidatively decomposed solve the problem of preparing photothermographic materials with increased photospeed without a significant increase in fog ($D_{min}$) or a loss in $D_{max}$. In contrast, Riester et al. is directed to phosphine sulfides as "supersensitizers" to enhance the performance of known spectral sensitizing dyes in photographic materials. The two problems are different. One skilled in the

photothermographic art would have no reason to consult photographic art relating to supersensitizers to provide chemical sensitizers for photothermographic materials. There is no logical connection between the different problems.

Thus, Riester et al. fails both tests required for it to be considered "analogous" art, Riester et al. is improperly cited against the presently claimed invention, and it is not properly combinable with the other three cited references.

In addition, since Riester et al. is directed to <u>photographic</u> emulsions, there is no discussion of the formation of *in-situ* photosensitive silver halide grains. Such grains are formed and used only in <u>photothermographic</u> emulsions since an organic silver salt must be present. The Office Action fails to address this critical difference and deficiency in Riester et al.

Without Riester et al., the three remaining references fail to support a *prima facie* rejection because there is nothing in those references to hint at the use of Applicants' diphenylphosphine sulfides for any purpose. Even the Office Action admits that Winslow et al., Uytterhoeven et al., and Morgan et al. fail to teach anything about the use of diphenylphosphine sulfides.

Even if Riester et al. could be properly combined with Winslow et al., Uytterhoeven et al., and Morgan et al., their combined teaching fails to provide a *prima facie* basis for unpatentability of the claimed invention.

Applicants agree that Winslow et al. teaches a useful method for chemical sensitization by decomposing sulfur-containing dyes onto preformed silver halide grains before the formation of *in-situ* silver halide grains. This is mentioned at Col. 13, lines 38-41 and also described in the Examples. However, the sulfur-containing compounds described in Winslow et al. do not include the diphenylphosphine sulfides used in the present invention. Thus, Winslow et al. is deficient in teaching Applicants' required decomposition of diphenylphosphine sulfides onto the preformed silver halide grains followed by formation of additional, <u>non-chemically sensitized</u> silver halide grains by an *in-situ* process after chemical sensitization.

The Office Action attempts to supply the missing teaching with Riester et al., Uytterhoeven et al., and Morgan et al. This attempt fails for the following reasons.

Riester et al. is directed to the use of a wide variety of phosphine sulfides in photographic materials. However, Riester et al. does not teach the use

of such compounds as chemical sensitizers. Rather, those compounds are used as "supersensitizers" for spectral sensitizing dyes. In other words, they are used to enhance the performance of known spectral sensitizing dyes, and more conventional compounds are then used as chemical sensitizers (see Col. 1, lines 37-48; and Col. 15, line 69 to Col. 16, line 26). The Examiner's attention is also directed to Example 1 where the merocyanine is added to the emulsion as a spectral sensitizer (Col. 17, lines 3-5). The phosphine sulfide compound was added and found to increase sensitivity of the spectral sensitizing dye (Table I). Similar teaching is found in the remaining examples. However, there is nothing in the Examples to suggest chemical sensitization by decomposition of any type of sulfur-containing compound let alone the phosphine sulfides. Indeed, since both the merocyanine spectral sensitizing dye and phosphine sulfide supersensitizer are sulfur-containing compounds, their decomposition would result in a non-sensitized photothermographic material.

Riester et al. also teaches that the phosphine sulfides can be added at any time in the preparation of a silver halide photographic emulsion (Col. 15, lines 16-24). There is no critical addition sequence for any type of emulsion let alone a photothermographic emulsion. This is in stark contrast to the present invention and Winslow et al. where sulfur-containing compounds <u>must</u> be added at a specific time and in an oxidizing environment to chemically sensitize the preformed silver halide grains. This is additional, incontrovertible evidence that Riester et al. is not teaching the use of these compounds as chemical sensitizers. Adding the phosphine sulfides at any time as taught by Riester et al. would produce many worthless embodiments—chemical sensitization just would not occur. For example, adding the phosphine sulfide after the addition of PHP (bromide-containing oxidizing agent) results in fogged emulsions. Moreover, if one combined the teaching of Winslow et al. and Riester et al., a skilled worker would be confused as to which procedure to follow since the Winslow et al. procedure would be one of many options.

One skilled in the art following the combined teaching of Riester et al. and Winslow et al. would recognize that Riester et al. teaches the use of numerous conventional chemical sensitizers (Col. 15, line 69 to Col. 16, line 26). However, such chemical sensitizers are not useful in the method of Winslow et al. In fact, Winslow et al. teaches away from the use of these conventional

compounds (Col. 9, lines 10-24). There is nothing in Riester et al. to suggest that the phosphine sulfides should be used as "chemical" sensitizers since they are used only to enhance the sensitivity of the "spectral" sensitizers.

Morgan et al. is not helpful to overcome this deficiency because it does not appear to suggest chemical sensitization for photothermographic emulsions. Morgan et al. is cited merely because it teaches the *in-situ* formation of silver bromide grains to prepare photothermographic materials.. However, it fails to teach the advantages of using both preformed silver halide grains and *in-situ* silver halide formation. As suggested in the Office Action, Morgan et al. actually <u>teaches away</u> from the use of both types of silver halide because the *in-situ* silver halide is said to enhance imaging capability "far beyond" that achieved by the "simple addition of preformed silver halide" (Col. 4, lines 8-13). As a result of this teaching, one skilled in the art would not be directed by Morgan et al. to do anything approaching Applicants' claimed method.

Further, Morgan et al. does not appear to suggest chemical sensitization for photothermographic emulsions at any time, whether before or after formation of *in-situ* photosensitive silver halide grains. Since Morgan et al. is limited to *in-situ* photosensitive silver halide grains, it fails to teach the use or chemical sensitization of a <u>mixture</u> of both preformed (*ex-situ*) and *in-situ* photosensitive silver halide grains.

The Examiner has for the first time cited Uytterhoeven et al. for the proposition that it teaches a mixture of *ex-situ* and *in-situ* silver halide grains in order to increase the sensitivity of photothermographic materials. This mixture is also taught in Winslow et al. where $CaBr_2$ and $ZnBr_2$ are added to generate *in-situ* silver halide after chemical sensitization. However, Uytterhoeven et al. <u>neglects to teach chemical sensitization of either type of silver halide grains by any process</u>. Thus, Uytterhoeven et al. adds nothing beyond that already described in Winslow et al.

Thus, the combination of the four references fails to teach or suggest the presently claimed invention because it would teach the use of conventional chemical sensitizers from Riester et al. with the decomposition of merocyanine dyes from Winslow et al.

In addition, Applicants have demonstrated that the use of diphenyl phosphine sulfides according to the present invention provides unexpected results

compared to the method of Winslow et al. and Riester et al. Applicants would point to the above discussion of the comparative results shown in Example 2 wherein the method of Winslow et al. was compared to the present invention. Applicants' method unexpectedly provided photothermographic materials with increased speed over the prior art method. These results are not suggested by anything in Winslow et al., Riester et al., Uytterhoeven et al., or Morgan et al. because the results are not predictable from their teaching, individually or in combination.

Further, the previously submitted **Rule 132 Declaration** provides additional evidence of unexpected results as it clearly shows from the data provided in copending U.S. Serial No. 10/731,251 that not just any phosphine sulfide will provide an increase in photospeed. Dr. Simpson has demonstrated that Applicants' choice in phosphine sulfide structure is critical to achieving the unexpected results. These unexpected results are not predictable from any teaching in the cited references, and in particular Riester et al., because Riester et al. broadly describes the useful "intensifying" compounds as having hundreds of possible aliphatic, cycloalkyl, aralkyl, aryl, or heterocyclic "R" substituents (Cols. 1-2). Riester et al. gives no preferences for the "R" substituents but lists 87 examples of compounds "particularly suitable for intensifying the sensitization effect of silver halide emulsion layers achieved with merocyanines" as spectral sensitizing dyes (Col. 3, line 15 to Col. 10, line 33). Compound 1 in Riester et al. is triphenylphosphine sulfide that was tested in the comparative example of Example 8 cited in Dr. Simpson's Declaration. Compound 1 was used in Examples 1, 3, 4, 5, 6, 7, and 8 of Riester et al. A few other compounds were also tested, but Compound 1 is clearly the <u>preferred</u> phosphine sulfide in Riester et al. from its predominance in the examples. Thus, it has been demonstrated that the use of Applicants' specific diphenylphosphine sulfides is unexpectedly better in photothermographic materials over the closest compound in Riester et al.

For all of these reasons, the rejection of the claims over Winslow et al., Riester et al., Uytterhoeven et al., and Morgan et al. is in error and should be withdrawn.

Rejection II:

Dependent Claims 14 and 18 have been rejected over the combination of Winslow et al., Riester et al., Uytterhoeven et al., and Morgan et al., in view of Simpson et al. This rejection is in error for the same reasons stated above in rebuttal of Rejection I. Nothing in Simpson et al. overcomes the deficiencies in the other three references. Simpson et al. is merely cited for its use of phosphors in photothermographic materials. While Applicants believe that Claims 14 and 18 are separately patentable over the combined four references, Applicants are not relying upon the recited phosphor for patentability of the generic invention. Rather, those dependent claims are also patentable because they are dependent upon patentable Claims 1 and 15. Thus, this rejection should be withdrawn.

**Double-Patenting Rejection**

III. In paragraph 5 of the Office Action, Claims 1-23 were rejected as being unpatentable under the judicially created doctrine of obviousness-type double patenting over Claims 1-19 of Winslow et al. in view of Morgan et al., Uytterhoeven et al, and Riester et al.

Applicants maintain their position that the double patenting rejection is faulty for the same reasons stated in rebuttal of Rejection I. Riester et al. is not properly combined with the claims of Winslow et al. any more than its text for the reasons stated above. Uytterhoeven provides nothing that was already known in Winslow et al. and Morgan disparages the use of preformed (*ex-situ*) silver halide grains. Moreover, even if combined, the teaching of the claims with Morgan et al., Uytterhoeven et al., and Riester et al. fails to provide a case for *prima facie* obviousness. As pointed out above, Applicants have also provided a showing of unexpected results that is evidence of patentability. Thus, the double patenting rejection over the claims of the 6-year old Winslow et al. with the two even older patents and Uytterhoeven is clearly unreasonable and without merit. No Terminal Disclaimer will be submitted for a 6-year old patent and the USPTO should reexamine its current burdensome practice regarding "double patenting" rejections in such instances.

**Response to Examiner's Arguments in Paragraph 6**

The comments in the Office Action in paragraph 6 are a recapitulation of the Examiner's previous arguments. Applicants' foregoing comments in rebuttal remain cogent. The Examiner fails to recognize that Reister et al. is non-analogous art and would appear to consider any publication in imaging science to be pertinent. The argument that silver halide emulsions are used in both photographic and photothermographic materials and thus a basis for this rejection in the Office Action is clearly indicative of a lack of scientific understanding of the different imaging chemistries, purposes, problems, expectations, and predictability, and the decades of different research needed to bring each type of imaging material to commercial success. Applicants have already pointed out above why Riester et al. is non-analogous art and particularly why it fails the "second" test stated by the Courts. The problems are different, pure and simple.

Moreover, one cannot use the teaching in Winslow et al. to "cure" the lack of teaching in Riester et al. about a different problem as the Examiner attempts to do on page 8 of the Office Action. The problem addressed in Riester et al. is not the same problem addressed in Winslow et al. The Courts have not said that non-analogous art can be made analogous art by looking at some other reference outside its field of endeavor. Thus, the Office Action uses circular reasoning to try to prove its point. Merely repeating unsupported opinions that a reference is "analogous" art and that the claimed invention is obvious several times during the course of this prosecution doesn't make it so.

Applicants have already pointed out also why the Rule 132 Declaration of Dr. Simpson is pertinent to Applicants' arguments. It is irrelevant that the invention in USSN 10/731,251 is directed to a "material" instead of a process. The Declaration demonstrated <u>both a material and a process of making</u> it, which process is so similar to the presently claimed invention as to render the comparative data pertinent and demonstrative of unexpected results.

As stated above, the Examiner should appreciate that the GOLD compounds tested in the Declaration were used at the same concentration so their effects were cancelled. The only effects measured in the comparative examples shown in the Declaration were those demonstrating the ineffectiveness of triphenylphosphine sulfides vs. the effectiveness of diphenylphosphine sulfides in

the sensitizing method. This comparison has scientific credibility, as any person skilled in the chemical arts, such as Dr. Sharon Simpson, would readily appreciate.

Since all of the issues raised in the "final" Office Action have been appropriately addressed with the foregoing amendments and remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the examiner to grant allowance is earnestly solicited in order to avoid an Appeal.

Respectfully submitted,

J. Lanny Tucker

Attorney for Applicant(s)
Registration No. 27,678

J. Lanny Tucker/s-p
Rochester, NY 14650
Telephone: (585) 722-9332
Facsimile: (585) 477-1148

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.